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EXAMINER KIM, HEE-YONG				
ART UNIT 2482		PAPER NUMBER		
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary

Application No.

10/587,939

Applicant(s)

SASAI ET AL.

Examiner

HEE-YONG KIM

Art Unit

2482

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 February 2011.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 4-9 and 12-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 4-9 and 12-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-942)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 11/8/2010
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. This office action is in reply to Applicant's Response dated February 11, 2011.
2. **Claims 2-3, and 10-11** have been cancelled.
3. **Claims 1, 4-9 and 12-21** have been amended.
4. **Claims 1, 4-9 and 12-21** are pending.

Response to Arguments

5. Rejection of **claims 20 and 21** under 35 U.S.C. 101 is withdrawn because amendment overcomes the previous rejection.
6. Applicant's arguments with respect to the prior art rejection over **claims 1, 4-9 and 12-21** have been considered but they are not persuasive.
7. Regarding **claim 1**, applicant argues (pp.17-18) that Purl merely teaches that the additional information could include the interpolation method or the residual information, but fails to disclose or suggest that the interpolation frame creation unit obtains an interpolation motion vector based on a ratio between a distance in terms of time between the decoded image frames and a distance in terms of time to an interpolation position of the interpolation frame for interpolating the image frames based on the first motion vector, and creates the interpolation frame based on the interpolation motion vector and the decoded image frames, wherein the additional information includes (i) an interpolation method for the interpolation frame with respect to the image frames, (ii) a motion detection method for detecting the first motion vector, and (iii) profile information

specifying a combination of information, and wherein the additional information further includes at least one of (i) residual information of the interpolation frame and an image frame corresponding to the interpolation frame, and (ii) a vector difference between a motion vector of the interpolation frame detected with respect to the image frames and a motion vector of the interpolation frame derived based on the first motion vector with respect to the image frames, as recited in claim 1. Examiner respectfully disagrees. Puri teaches that the interpolation frame creation unit obtains an interpolation motion vector based on a ratio (Fig.2 and Fig.3 shows that interpolation motion vectors are derived from existing decoded motion vectors by either ratio 1:1, or 2:1 based on temporal distance) between a distance in terms of time between the decoded image frames and a distance in terms of time to an interpolation position of the interpolation frame for interpolating the image frames based on the first motion vector, and creates the interpolation frame (Fig.2 and Fig.3) based on the interpolation motion vector and the decoded image frames, wherein the additional information includes (i) an interpolation method (obvious to include temporal position in the frame header, in order to derive interpolation motion vector) for the interpolation frame with respect to the image frames, (ii) a motion detection method (motion search range is a property of MPEG video encoded stream) for detecting the first motion vector, and (iii) profile information (obvious to include a profile (flag) whether to include a residual information or not, for CMCI coding, pp.131 and 1323) specifying a combination of information, and wherein the additional information further includes at least one of (i) residual information (MCIE (Motion Compensated Interpolation Error, pp.131, right col., line 1-3) of the

interpolation frame and an image frame corresponding to the interpolation frame, and (ii) a vector difference between a motion vector of the interpolation frame detected with respect to the image frames and a motion vector of the interpolation frame derived based on the first motion vector with respect to the image frames.

8. Regarding remaining claims, applicant argues that they are allowable because they have similar features as claim 1. Since the examiner maintains the rejection of claim 1, the argument is groundless.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. **Claims 1, 6, 8-9, 13 and 15-21** are rejected under 35 U.S.C. 103(a) as being unpatentable over Puri (Signal Processing Image Communication 2 (1990), No.2), hereafter referenced as Puri.

Regarding **claim 1**, Puri discloses Video Coding With Motion-Compensated Interpolation for CD-ROM Applications. Specifically Puri discloses A decoding device (Fig.7), comprising: a decoding unit operable to decode an encoded image signal (Bitstream, Fig.7) obtained by encoding image frames (Fig.5 MCMI-MPEG encoder) of an image signal and by encoding additional information (MCIE (Motion Compensated Interpolation Error), pp.131 left col., paragraph 2) for creating an interpolation frame

(interpolation frames F1 at Fig.2: F1 and F2, Fig.3) for interpolating the image frames based on a first motion vector (d_{02} , Fig.2) that is a motion vector between the image frames (F0 and F2, Fig.2), so as to output decoded image frames of the image signal and decoded additional information;

a motion vector detection unit operable to detect a second motion vector (d_{01} and d_{12} , Fig.2) which is a motion vector between (i) the image frames (F1 at Fig.2) of the encoded image signal which are decoded based on the decoded additional information output from the decoding unit and (ii) the decoded image frames output (Frames F0 and F2 at Fig.2) from the decoding unit; and

an interpolation flame creation unit operable to create an interpolation frame, considering the detected second motion vector as the first motion vector (Second motion vectors are now considered as motion vectors between the frame to be interpolated (interpolation frames F1 at Fig.2: F1 and F2, Fig.3) and the decoded frames (Frames F0 and F2 at Fig.2)), such that the created interpolation flame is created based on the second motion vector (blocks b0 and b2 are averaged to yield interpolation, pp.131, right col., line 1-3), the decoded image frames output (Frames F0 and F2 at Fig.2) from the decoding unit which are decoded, and the decoded additional information output from the decoding unit ,

wherein the interpolation frame creation unit (interpolation frames F1 at Fig.2: F1 and F2, Fig.3) obtains an interpolation motion vector (d_{01} and d_{12} , Fig.2) based on a ratio (1:1 in Fig.2 and 2:1 in Fig.3) between a distance in terms of time (motion-fields are obtained by scaling the available motion-field, pp.132, left col, line 1-12) between the

decoded image frames and a distance in terms of time to an interpolation position of the interpolation frame (interpolation frames F1 at Fig.2: F1 and F2, Fig.3) for interpolating the image frames based on the first motion vector, and creates the interpolation frame based on the interpolation motion vector and the decoded image frames, wherein the additional information includes (ii) a motion detection method (motion search range which is sent in the frame header is a property of MPEG video compression) for detecting the first motion vector, wherein the additional information further includes at least one of (i) residual information (MCIE (Motion Compensated Interpolation Error, pp.131, right col., line 1-3) of the interpolation frame and an image frame corresponding to the interpolation frame, and (ii) a vector difference between a motion vector of the interpolation frame detected with respect to the image frames and a motion vector of the interpolation frame derived based on the first motion vector with respect to the image frames.

However, Puri is silent on wherein the additional information includes (i) an interpolation method for the interpolation frame with respect to the image frames, (ii) a motion detection method (motion search range which is sent in the frame header is a property of MPEG video compression) for detecting the first motion vector, and (iii) profile information specifying a combination of information.

Puri discloses deriving interpolation motion vectors based on temporal difference between the interpolation frame and the reference frames (Fig.2 and Fig.3).

Therefore, given this teaching, it would have been obvious to one of ordinary skill in the art at the time invention was made to modify Puri by providing specifically addition

information further including temporal position of the interpolation frame, in order to derive the second motion vectors from the first motion vector.

Puri further discloses CMCI (conditional Motion Compensated Interpolation) such that residual (motion compensated interpolation error) is only transmitted when it is significant (pp.130-131, principle of CMCI).

Therefore, given this teaching, it would have been obvious to one of ordinary skill in the art at the time invention was made to modify Puri by providing specifically addition information further including the flag (profile information), in order to inform whether there is residual or not. The Puri CMCI coding, incorporating addition information further including temporal position of the interpolation frame and the flag (profile information) in order to inform whether there is residual or not, has all the features of claim 1.

1.

Regarding **claim 6**, Puri discloses everything claimed as above (see claim 1). In addition, Puri discloses wherein the additional information (MCIE, pp.131, right col., line 1-3) is information produced for every interpolation frame (quantized and encoded as in single-frame CMCI, pp.132, left col., first paragraph).

Regarding **claim 8**, Puri discloses everything claimed as above (see claim 1). In addition, Puri discloses wherein, when the additional information (MCIE, pp.131, right col., line 1-3) is not included in the encoded image signal, the interpolation frame creation unit creates the interpolation frame (Fig.2 and Fig.3 Frame Interpolation) based on the decoded image frames (Decoded frame F0 and F2 in Fig.2).

Regarding **claim 9**, the claimed invention is the encoder corresponding to decoder described by claim 1. Encoder is the inverse of the decoder. Therefore, it was obvious over Puri.

Regarding **claim 13**, the claimed invention is the encoder corresponding to decoder described by claim 6. Encoder is the inverse of the decoder. Therefore, it was obvious over Puri.

Regarding **claim 15**, Puri teaches everything claimed as above (see claim 9). Puri teaches embedding the flag (profile information) into the additional information, in order to inform whether there is residual or not (see above claim 3).

Therefore, given this teaching, it would have been obvious to one of ordinary skill in the art at the time invention was made to modify Puri by providing specifically wherein the profile information is included as header information of a stream of the image signal, in order to inform whether there is residual or not. The Puri CMCI coding, incorporating addition information further including temporal position of the interpolation frame and the flag (profile information) embedded into the header in order to inform whether there is residual or not, has all the features of claim 15.

Regarding **claim 16**, Puri teaches everything claimed as above (see claim 9). Puri further discloses wherein, when a residual between an interpolation frame created based on the image frames and the image signal corresponding to the interpolation frame is small, the encoding unit does not encode the additional information (Motion-compensated interpolation error is coded where it is significant, pp.131. left col., paragraph 2).

Regarding **claim 17**, the Puri CMCI coding, incorporating addition information further including temporal position of the interpolation frame and the flag (profile information) in order to inform whether there is residual or not, as applied to claim 1, discloses An interpolation frame creating system for creating an interpolation frame (Fig.5 and Fig.6: CMCI MPEG encoder and decoder) which interpolates image frames forming an image signal, comprising:

a first motion vector detection unit operable to detect a first motion vector (d_{02} , Fig.2) which is a motion vector between the image frames (F_0 and F_2 , Fig.2) of the image signal;

an additional information production unit operable to produce additional information (MCIE (Motion Compensated Interpolation Error), pp.131 left col., paragraph 2, incorporating addition information further including temporal position of the interpolation frame and embedding the flag (profile information) in order to inform whether there is residual or not) for creating the interpolation frame from the image frames and creating a motion vector for the interpolation frame, the motion vector being derived (Fig.2 and Fig.3) from the first motion vector based on a ratio between a distance in terms of time between the image frames and a distance in terms of time to an interpolation position of the interpolation frame, based on the first motion vector and the image frames;

an encoding unit (VWL Encode and Multiplex, Fig.5) operable to encode the image frames and the additional information;

a decoding unit (Fig.6) operable to decode the encoded image frames and the encoded

additional information so as to output decoded image frames of the image and decoded additional information (incorporating addition information further including temporal position of the interpolation frame and embedding the flag (profile information));

a second motion vector (d_{01} and d_{12} , Fig.2) detection unit operable to detect a second motion vector which is a motion vector between (i) the image frames (F1 at Fig.2) of the encoded image signal which are decoded based on the decoded additional information output from the decoding unit and (ii) the decoded image frames output (Frames F0 and F2 at Fig.2) from the decoding unit; and

an interpolation frame creation unit (Fig.2 and Fig.3) operable to create an interpolation frame, considering the detected second motion vector (d_{01} and d_{12} , Fig.2) as the first motion vector (Second motion vectors are now considered as motion vectors between the frame to be interpolated (interpolation frames F1 at Fig.2: F1 and F2, Fig.3) and the decoded frames (Frames F0 and F2 at Fig.2)), such that the created interpolation frame is created based on the second motion vector, the decoded image frames output from the decoding unit which are decoded, and the decoded additional information output (MCIE (Motion Compensated Interpolation Error), pp.131 left col., paragraph 2, incorporating addition information further including temporal position of the interpolation frame and embedding the flag (profile information)) from the decoding unit ,

wherein the interpolation frame creation unit (interpolation frames F1 at Fig.2: F1 and F2, Fig.3) obtains an interpolation motion vector (d_{01} and d_{12} , Fig.2) based on a ratio (1:1 in Fig.2 and 2:1 in Fig.3) between a distance in terms of time (motion-fields are obtained by scaling the available motion-field, pp.132, left col, line 1-12) between the

decoded image frames and a distance in terms of time to an interpolation position of the interpolation frame (interpolation frames F1 at Fig.2: F1 and F2, Fig.3) for interpolating the image frames based on the first motion vector, and creates the interpolation frame based on the interpolation motion vector and the decoded image frames, wherein the additional information includes (i) an interpolation method (frame position or temporal order of the interpolation frame as shown in Fig.2 and Fig.3 should be sent, in order to derive second motion vectors) for the interpolation frame with respect to the image frames, (ii) a motion detection method (motion search range which is sent in the frame header is a property of MPEG video compression) for detecting the first motion vector, and (iii) profile information (incorporating additional information further including the flag (profile information) in order to inform whether there is residual or not) specifying a combination of information, and wherein the additional information further includes at least one of (i) residual information (MCIE (Motion Compensated Interpolation Error, pp.131, right col., line 1-3) of the interpolation frame and an image frame corresponding to the interpolation frame, and (ii) a vector difference between a motion vector of the interpolation frame detected with respect to the image frames and a motion vector of the interpolation frame derived based on the first motion vector with respect to the image frames.

Regarding **claim 18**, the claimed invention is an implementation of claim 1 into an integrated circuit. Puri teaches every features of claim 1 and further teaches An integrated circuit device (VLSI, pp.140, left col., last line). Therefore, Puri teaches every features of claim 18.

Regarding **claim 19**, the Puri CMCI coding, incorporating addition information further including temporal position of the interpolation frame and the flag (profile information) in order to inform whether there is residual or not, as applied to claim 17, discloses An integrated circuit device (VLSI, pp.140, left col., last line), comprising: a first motion vector detection section operable to detect a first motion vector (d_{02} , Fig.2) which is a motion vector between image frames (F0 and F2, Fig.2) of an image signal; an additional information production unit operable to produce additional information (MCIE (Motion Compensated Interpolation Error), pp.131 left col., paragraph 2, incorporating addition information further including temporal position of the interpolation frame and embedding the flag (profile information) in order to inform whether there is residual or not) for creating the interpolation frame from the image frames and creating a motion vector for the interpolation frame, the motion vector being derived (Fig.2 and Fig.3) from the first motion vector based on a ratio between a distance in terms of time between the image frames and a distance in terms of time to an interpolation position of the interpolation frame, based on the first motion vector and the image frames; and an encoding section (VWL Encode and Multiplex, Fig.5) for encoding the image frames and the additional information.

wherein the interpolation frame creation unit (interpolation frames F1 at Fig.2: F1 and F2, Fig.3) obtains an interpolation motion vector (d_{01} and d_{12} , Fig.2) based on a ratio (1:1 in Fig.2 and 2:1 in Fig.3) between a distance in terms of time (motion-fields are obtained by scaling the available motion-field, pp.132, left col, line 1-12) between the decoded image frames and a distance in terms of time to an interpolation position of

the interpolation frame (interpolation frames F1 at Fig.2: F1 and F2, Fig.3) for interpolating the image frames based on the first motion vector, and creates the interpolation frame based on the interpolation motion vector and the decoded image frames, wherein the additional information includes (i) an interpolation method (frame position or temporal order of the interpolation frame as shown in Fig.2 and Fig.3 should be sent, in order to derive second motion vectors) for the interpolation frame with respect to the image frames, (ii) a motion detection method (motion search range which is sent in the frame header is a property of MPEG video compression) for detecting the first motion vector, and (iii) profile information (incorporating addition information further including the flag (profile information) in order to inform whether there is residual or not) specifying a combination of information, and wherein the additional information further includes at least one of (i) residual information (MCIE (Motion Compensated Interpolation Error, pp.131, right col., line 1-3) of the interpolation frame and an image frame corresponding to the interpolation frame, and (ii) a vector difference between a motion vector of the interpolation frame detected with respect to the image frames and a motion vector of the interpolation frame derived based on the first motion vector with respect to the image frames.

Regarding **claim 20**, the claimed invention is a computer readable medium claim corresponding to the apparatus claim 1. Therefore, it is rejected for the same reason as claim 1.

Regarding **claim 21**, the claimed invention is a computer readable medium claim corresponding to the apparatus claim 19. Therefore, it is rejected for the same reason as claim 19.

11. **Claims 4-5, 7, 12, and 14** are rejected under 35 U.S.C. 103(a) as being unpatentable over Puri in view of Hosono (US 5,796,438), hereafter referenced as Hosono.

Regarding **claim 4**, Puri discloses everything claimed as above (see claim 2). However, Puri fails to disclose wherein: the motion detection method is included as code information for specifying a combination of parameters of motion detection; and the motion vector detection unit detects the second motion vector based on the parameters of the motion detection specified by the code information.

In the similar field of endeavor, Hosono discloses Method and Apparatus for Interpolating Picture Information. Hosono specifically discloses wherein: the motion detection method is included as code information (full_pel_forward_vector, col.10, line 65-66) for specifying a combination of parameters of motion detection (Full pel or Half pel motion vector, col.10, line 64-67), in order to specify pel or half-pel based motion estimation (col.10, line 64-67).

Therefore, given this teaching, it would have been obvious to one of ordinary skill in the art at the time invention was made to modify Puri by providing specifically full or half pixel motion estimation based on motion detection method (full_pel_forward_vector), in order to specify pel or half-pel based motion estimation. The Puri CMC1 coding,

incorporating addition information further including temporal position of the interpolation frame and the flag (profile information) in order to inform whether there is residual or not, further incorporating the Hosono full or half pixel motion estimation based on motion detection method (full_pel_forward_vector), has all the features of claim 4.

Regarding **claim 5**, Puri and Hosono disclose everything except wherein, when the motion detection method included in the additional information cannot be performed, the motion vector detection unit detects the second motion vector using a predetermined motion detection method determined in accordance with the motion detection method included in the additional information.

However, it was obvious to one of ordinary skill in the art at the time invention that if half-pel motion detection was indicated but cannot be performed because of computation burden, the pixel accuracy motion estimation can be substituted, in order to reduce computation cost.

Regarding **claim 7**, the Puri CMC1 coding, incorporating addition information further including temporal position of the interpolation frame and the flag (profile information) in order to inform whether there is residual or not, further incorporating the Hosono full or half pixel motion estimation based on motion detection method (full_pel_forward_vector), as applied to claim 4, disclose wherein the motion detection method in the additional information is information produced for every stream (Hosono: the picture layer, col.10, line 64-67) of the encoded image signal.

Regarding **claim 12**, the claimed invention is the decoder corresponding to encoder described by claim 4. Decoder is the inverse of the encoder. Therefore, it was obvious over Puri in view of Hosono.

Regarding **claim 14**, the claimed invention is the decoder corresponding to encoder described by claim 7. Decoder is the inverse of the encoder. Therefore, it was obvious over Puri in view of Hosono.

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to HEE-YONG KIM whose telephone number is (571)270-3669. The examiner can normally be reached on Monday-Thursday, 8:00am-5pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marsha Banks-Harold can be reached on 571-272-7905. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/HEE-YONG KIM/
Examiner, Art Unit 2482

/Andy S. Rao/
Primary Examiner, Art Unit 2486
March 23, 2011